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JULY, 1934

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PUBLISHED MONTHLY, except for a special double issue in January, March, May, and October. Subscription price, \$2.00 per year in advance. Single copies, 25 cents. Second-class postage paid at New York, N.Y., and at additional mailing offices. Postmaster: Please send address changes to AVIATION, c/o National Aeronautics Council, 234 W. 42nd St., New York, N.Y. Please allow four weeks for change of address to take effect. Entered as Second-Class Matter, October 10, 1928, under No. 107, Post Office Department, New York, N.Y. Acceptance for mailing at special rate of postage provided for in Act of October 3, 1917, authorized on July 1, 1934. Postpaid at New York, N.Y.

AVIATION

Published 10th Before the Post Office, October 10, 1934
THE SLAVE AMERICAN AERONAUTICAL MAGAZINE

Editor: P. Warner Editor and Louis F. Zell, Vice-President

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Paul Weston Publisher



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McGraw-Hill Publishing Company, Inc., 234 W. 42nd St., New York, N. Y.
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Pg. 1695

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AVIATION

FOR JULY, 1934

Research on Parade

The Ninth Langley Field Conference of the N.A.C.A. has a record attendance of representatives of all branches of the industry

EACH YEAR the industry learns more about how to use the National Advisory Committee for Aeronautics in the solution of engineering problems and each year a larger group attends the gatherings at Langley Field where research progress is brought up-to-date and future plans are made. Each succeeding conference being larger than the one before, presents a new accommodation problem to the members of the committee charged with the arrangements. The majority expanded its pressing the facilities in parallel by the investments deployed in building means of demonstrating research, and in this respect the work in number of these annual conferences was particularly rich. No plans were spared in planning methods to enable the visitors to visualize the test results.

There is a new appreciation of the committee and its work. It is shared by every important branch of the industry, for among the visitors were found representatives not only of the manufacturers of military aircraft and engines but of engineers and light-weight aircraft plants, as well as the operators of aircraft lines and members of the Aeronautics Branch of the Department of Commerce. Despite the attractiveness of the gatherings on the land trips down from Washington and back, a large contingent are actually forbidden to arrive! The number of visiting airplanes on the field was greater than ever before. As for officers of the Services, so many of them wanted to attend that

arrangements had to be made to represent the whole program on a special Army-Navy Day.

The morning session

Following the address of welcome by Col. A. L. Saco, Commandant of Langley Field, and Dr. Joseph S. Ames, chairman of the association, Fred R. Weick, Senior Aeronautical Engineer, outlined the activities of the Aeronautics Section at the close of its chief, Elmer W. Miller. Mr. Weick began by discussing the work done in the 7-10-6, named on the determination of air loads on ribs and flaps. In general it was of auxiliary movable surface near the leading edge (as in the Fowler wing) carries a proportion of the maximum load based on the wing just about equal to its proportion of the total area. Reducing of flaps with a lowered position for the flap hinge could be made to reduce the control force necessary by one-half.

A practical application of the study of high lift devices was made in a series of tests of their effect on the take-off characteristics of a transport plane having a maximum speed of 200 m.p.h. and a wing loading of 22 lb. per sq ft. The drag of the high flap, deflected for maximum lift, increased the take off run required to clear a 50 ft. obstacle about three times, while the take-off distance with the plane wing was decreased about one-third by the use of a high Fowler flap. A direct approach to the ideal condition, in which increased lift could be

obtained with no increase in profile drag, could be obtained by control of the airfoil boundary layer, if this could be accomplished with almost negligible expenditure of power, and an investigation was initiated to determine the best method to accomplish this and what the cost in power would be.

Both the suction and the pressure types of boundary layer control were tried through tests of various vane located in a number of positions along the chord, and the best of the evaluation tests required a blower horsepower of 15 per cent of the engine power to obtain a maximum lift coefficient of 3.0. The evaluation test was made under conditions, requiring slightly over 2 per cent of the engine power to attain the same lift coefficient. This spectacular increase in lift would make possible a maximum speed of 50 m.p.h. with a wing loading of approximately 20 lb. per sq ft.

Closely associated with the study of high lift devices is a complete investigation of lateral control, and a large series of tests have shown that no conventional system provided control above the stall. A disadvantage was found in the use of spoilers because of their delayed action in lag, but this can be almost entirely eliminated by locating the spoiler in a slot passing clear through the wing. Particularly high hopes are held, however, for a reasonable system for use with full span flaps, which is now being tested in the Flight Research Section. This system is essentially a surface retracting vertically into a slot located

During the past few years research has developed new alloys and new manufacturing technique for aluminum as applied to aircraft. In the series of three articles, of which this is the first, members of the Technical Staff of the Aluminum Company of America will bring our readers up to date on these materials. The present article deals with the properties and the fabrication of certain wrought aluminum alloys. Subsequent articles will deal with open casting and casting, and also with the casting and forging alloys.

Aluminum Alloys Up to Date

By C. F. Nagel, Jr., and F. C. Pyne

THE first phase of aeronautical activity concerned the better problem of learning how to build machines that would fly. The second phase centered on learning how to fly well. The subsequent developing fundamental laws and applying them to practical considerations. Needless to say, the end of this chapter has not yet been written.

The industry is now reaching a third phase—learning to fly consistently, safely and, above all, at low cost. The cold, probing process of economics are now consistently being concerned. William B. Stout's famous dictum becomes increasingly significant: "Cost-conscious aviation is the art of supporting oneself financially in the air." Recent developments in wrought aluminum alloys and their fabrication have all been motivated by a desire to lower first cost and to reduce maintenance expense for operating companies so that they may achieve real "commercial" status.

As duralumin, or Alclad, Aluminum Company of America's 17S, is the aluminum alloy that was most generally used in the construction from the old wood, wire, and fabric to the present all-metal construction and, as the characteristics of this alloy are now so widely understood, 17S will be employed herein as the reference point.

In Table I are shown typical mechanical properties of 17S and Alclad 17S, as well as those of a newer high strength aluminum alloy, 24S, and



Aluminum alloys are being developed to meet the needs of modern aircraft. These typical aluminum structures (Douglas DC-4, lower left, and Lockheed F-104) use a 24S Alclad skin over Alclad 17S internal structure and supports.

Alclad 24S in its several grades, tempers and forms. When the design engineer can achieve effectively the same properties of the newer alloys, the effects on weight saving and performance are obvious.

Extensive tests and experiences have indicated that the corrosion resistance of 24S and 17S is comparable to that of 17S-T and Alclad 17S-T. A corrosion resistance equal to that of Alclad 17S-T.

24S fabrication technique

In some respects, however, 24S differs from 17S. These differences find practical expression in the aircraft plant and hence should be recognized and understood.

1. The proper heat-treating temperature for 24S is 525 deg. F. while for 17S it is 340 deg. F. In other words

24S calls for a lower treatment temperature. It also calls for a smaller variation from that for 17S. The variation for 24S should not exceed plus or minus 10 deg. This requirement can be met by the standard manufacturing with present facilities and some in other words it agrees with practice.

2. Also, 24S requires an full strength after heat-treatment in a shorter time in other words it agrees with practice.

3. Also, 24S in the heat treated state, either immediately after quenching or after full aging, is not quite so workable as alloy 17S. For example, when a bending radius of two times the sheet thickness is required for 17S-T, a radius of about three times the material thickness should be used for 24S-T. This difference does not exist in the annealed (O) state. The workability of 24S-O and 17S-O are quite alike.

These three points emphasize the main

Table I
Typical Mechanical Properties*

Tensile Strength (ksi) min.	Yield Point (ksi) min.	Elongation (in./in.) (in. 2 in.)
17S-T	40,000	12.000
Alclad 17S-T	40,000	12.000
24S-T	40,000	12.000
Alclad 24S-T	40,000	12.000
17S-O	30,000	12.000
Alclad 17S-O	30,000	12.000
24S-O	30,000	12.000
Alclad 24S-O	30,000	12.000

EXPERIMENTAL RESULTS

*The designating the condition of the material after the specified O indicates the material condition. T indicates the material condition after the T condition.

and differences between 24S and 17S to which the fabricator must give due attention. Note that the nature of these differences is not in kind but in degree. They also apply to the comparable Alclad version of the two alloys.

Few factory changes

The aircraft manufacturer will naturally wonder how such differences will affect him should he change from 17S to 24S, or to Alclad 24S. In other words, can an aircraft manufacturer, equipped for and experienced in the manufacture of 17S or Alclad 17S, substitute 24S or Alclad 24S in considerable quantities without appreciable expense for new tools and without an undue degree of difficulty? Presumably the most logical answer to this question is that several of the largest aircraft plants in the country have successfully made this conversion during the past year and a half and are now fully equipped and on 24S and Alclad 24S for the major portion of their construction.

Alloy 24S is available in the same tempers and in practically all the same forms and sizes as 17S—just as sheet, plate, tubing, extruded shapes, wire, rivets, bolts, etc. Alclad 24S sheet is also available in substantially the same sizes as Alclad 17S sheet.

Where 24S is substituted for 17S and no other fundamental changes are made, except in quenching, reheating, or tempering, a marked reduction in the weight of the structure can be effected. While this will give better weight/performance, the saving in weight alone is not sufficient to allow broadly either the original cost or the cost of maintenance. Substantial cost reductions can be accomplished, however, by certain additional changes in procedure.

It is quite standard aeronautical prac-

EDITORIALS

AVIATION

EDWARD P. WANNEN, Editor

The Aeronautics Branch
Writes a Specification

THERE is a wonderful scheme, that has stirred worldwide audiences to longed-for laughter over many years, about how a gentleman of Mordic eccentricity crossed a boat. As he rowed down the dock, he saw a steadily-rolling strip of water between the ferry's stern and the straggler. He saw, too, an excited friend standing on the ferry and exhorting him to nautical effort: "Yump, Peter, jump! I bet you can make it in two jumps!"

The Department of Commerce has decided to make it in two jumps in the campaign to promote the private-ownership market on a broad scale.

When the discussion of \$700 airplanes began, some seven months ago, there were two distinctive objectives. There was the purpose to bring the prices of airplanes to well below existing levels. There was a purpose also to promote the development of a machine of low-cost performance and range of use, without, but certainly easy to fly for the layman-headed club to fly with little instruction and without getting himself into subsequent trouble. The combination of aims proved impossible to realize, at least for the time being, but out of all the furious discussion of the matter something survived. The first objective has been laid aside. The second is to be promoted on new lines and with new intensity. Leaving a learning of trial period to the ordinary processes of industrial price determination and to the natural desire of every manufacturer to find the broadest possible market, the Aeronautics Branch is now concentrating on going after a new set of flying qualities. It's a good move, and it supports our hope, expressed at the time of the original Vindictive machine and from time to time during the subsequent construction, that though a \$700 airplane might not come out of the gate now after useful trial result.

ELSEWHERE in this issue of AVIATION we are giving a substantial amount of space to the specifications under which the Aeronautics Branch wants to purchase 25 new airplanes, and to one possible line of development of a machine to meet them. A remarkable set of requirements, they deserve the most careful study. They have been written in terms of the depart-

ment's own desire for certain machines for its own use, but, incidentally, they ought to encourage the creation of a new species of airplane peculiarly suitable for certain private owners.

We have so far been dealing almost entirely with the private owner who is willing to take a lively interest in aviation and to treat it with some little seriousness. If we are ever to develop real mass production we are going to have to think in terms of the individual who wants to do nothing with an airplane except to steer it. He is the fellow who, when his car breaks down, instantly starts for the nearest telephone and calls for a garage to come to the rescue. He is the fellow who buys a fast motor boat and uses it about on Sunday days without ever bothering to learn anything of seamanship except a few rudimentary rules of the road. When he takes up aviation he wants to go into it ten hours and to start off without trouble with a passenger in tow or in flight, and to do it without any appreciable danger. In case of engine failure or bad weather, he wants to have about three simple rules for making a forced landing with a minimum of exercise of judgment. He probably wants, in short, more than he can be given, but if his desire and the extent to which he is willing to sacrifice pure performance are borne in mind it may be possible to go far enough towards satisfying him so that he could be made into a pleased customer. That seems to be hinted in the department's present idea of an airplane that will be engine-proof and spin-proof, that can be flown with only two of the three controls, that can be landed either by pulling the stick hand back and waiting for the ground to come up and hit the wheels or by flying straight onto the ground at high speed and pulling the levers on hard, and that will have no more than 300 hp. for two passengers and will run for at least 50-hour intervals without any stoppages at the present place. If a machine to meet the requirements of the Department of Commerce under these new specifications can be developed and put on the market at a reasonable price by present standards, it may be possible to demonstrate sufficiently so that a very substantial market can be found in broad-run quantities. At least it's worth trying, and we shall be much disappointed if the industry fails to produce at least three or four serious competitors when the bids for the new ships are opened.

A Wreath of Laurel
for Controllable Pitch

ON SOME twenty shields around its base the Collier Trophy now bears the records of a wide variety of "greatest achievements" of as many different years. Gathering later in the course of its history, the trophy has come to hold a significance that nothing of the kind in any other country ever remotely parallels. It has been the subject of a wealth of thousand tributes, testimony to the loss of the competition, and perhaps even more than this year. One does not need to have been a member of the audience of record nor the recipient of its special confidence to know that those were days to a dozen serious contestants. They all had strong claims, with plenty of outside endorsements. All of the cases were well presented. To have been picked as victor in such a heated fray is no mean distinction. To the Hamilton-Standard Propeller Company, deserved congratulations.

Though the award is officially made for the record of a year it has been the case in the last two years at least that it has inevitably attached itself in our imaginations to much more than that. Winning the trophy for 1935, Glenn Martin was recognized not only as the creator of a particular military aircraft of remarkable performance and efficiency, but also as the unflinchingly persistent developer of landing craft for the Army and Navy over many years, his 1932 design the logical outgrowth of a consistent placing of emphasis on improvement that was back to the original Martin bomber of 1918. In reaching the same way, the award just made last month recognizes not only the production of a type of unsuitable-pitch propeller that has gone into a large proportion of the new American transport planes and a substantial number of those built abroad, but also some dozen years of unremitting devotion to the unsolvable pitch idea and study of its possibilities in all its various alternative forms.

Frank Caldwell was building gliders in 1910. He was a propeller man by 1915. He was working with Seth Hart on a controllable pitch design by 1918. As that time it seemed a bit of questionable value. The transport plane of 1924, with a speed range of three to one, and a required ability to carry on with one engine dead and a resultant power loading of more than 20 lb. a horsepower and planned for full-throttle cruising at from 9,000 to 14,000 ft., was not only beyond the reach of engineering fifteen years ago but even beyond the reach of imagination. But when the success-thrusts arrived, and their transport plans with them, and when it became necessary to have a controllable-pitch propeller if the full possibilities of the airplane were to be realized, the controllable-pitch propeller was ready because of the persistence of a few enthusiasts who had refused to admit that they were young and years ahead of their time.

In a business in which the turn-over of personnel

and of organizations has been high, and in which some of the pioneers have met with large shares of misfortune, it is a great satisfaction to see an old-timer who has more than kept up with the times both through recognition and got it. Both on the record of his work in 1935 and for the foundation that he had many years earlier, Mr. Caldwell qualifies. The Collier Trophy committee, ratifying his qualifications, makes a distinguished addition to an extremely distinguished list.

To Find the Truth,—
or to Find a Victim?

AT THE MOMENT when this editorial must be written it has not yet been possible to its hands on a complete copy of the Rogers subcommittee's report on the operations of the Army Air Corps. Detailed comment on that, as on a good many other developments of the closing days of the 75th Congress, must wait next month. One thing, however, we can say on the strength of the committee's authorized summary of their conclusions and recommendations.

That is that there emerges from every line an urgent determination to make the present reorganization of the Air Corps, and especially its present Chief, the scapegoat not only for all the mistakes that have been made and for everything that has gone wrong over the last half-dozen years but also for any decisions on policy that may have been out of accord with the views of some of the members of the committee.

Specifically, there is protestation. There are various ways of saying military airplanes. Most people who have made enough of a study of the subject to qualify in authorities are agreed that purchase by negotiation with the producer of the most desirable design is, if not the only way, at least one of the best. It is the method that both the Army and Navy long ago decided to use to the best of possibility under the law, and both have done so. Since the time of the Morrow Board and the passage of the Procurement Act of 1932 purchase by negotiation has been the practice of three Chiefs of Air Corps, with the approval of three Secretaries of War and the Assistant Secretaries, including the one specifically charged with associated matters. To make it appear now that that method is fundamentally improper and to concentrate personal responsibility upon General Findley is to be equivalent to even those of fairness that the blindfolded figure of Justice throws in again.

We shall have more to say of this matter later, after the grounds for the charges that have been made have become more apparent. Not even for a moment, however, could we let the attempt to make a victim of the world's first military airplane pilot in so casual a fashion and without formal trial or the putting in of a formal defense, pass without at least this much of instant indignant reaction.

NEWS OF THE MONTH

- ★ **AIR MAIL AND TRANSPORT** . . . Post Office Department's new map means completion at last of temporary contracts are let to lowest bidder.
- Compromise version of the Air Mail Bill with many new features, signed by President . . . Aeronautics Branch starts new airway installation program, providing more landing fields and radio directional guidance. . . . Traffic volume swells as operators put on additional schedules with new equipment and faster service. . . . North American Aviation reorganizes to meet terms of new air mail legislation. . . . Protecting cancellation, Pennsylvania Air Lines files suit against Postmaster General Farley. . . . Case of United Air Lines subsidiary vs. Farley dismissed by District of Columbia Supreme Court. . . . Transcontinental & Western Air's suit again dismissed in Court of Appeals. . . . Air Commerce Act amended to empower Commerce Department to investigate accidents more comprehensively and to make findings public.
- ★ **SEITCHER** . . . Navy gets promise of money for \$255 planes from Public Works deficiency funds. . . . U.S.S.

- Ranger commissioned. . . . House Military Affairs subcommittee charges inefficiency in management of the Army Air Corps, urges removal of Maj. General B. D. Fiedler. . . . War Board continues sessions at War College.
- ★ **FOREIGN** . . . France's speedy Concorde-Bombardier wins Coupe Deutsch de la Meurthe, breaks two world's records. . . . Codelco and Rossi fly west from Le Bourget to Floyd Bennett, New York. . . . French government conducts experiments with Paris-Rio de Janeiro mail service by sending mail plane across the South Atlantic. . . . Germany's forthrightly South American mail service ranging smoothly. . . . Poland moves toward a more important position in European aviation with completion of huge modern airport at Warsaw. . . . Germany and England celebrate Aviation Days.
- ★ **MISCELLANEOUS** . . . Collier Trophy goes to Frank W. Caldwell of Hawthorn Standard. . . . List of entries for the MacRobertson Race shows more than a third of the planes American-built.

Last mail contracts awarded

ON JUNE 1 Postmaster General Farley began to put the finishing touches on the new air mail map by awarding temporary contracts on the routes for which bids were opened on May 25 (AVIATION, June, page 380). Four went to American Airlines, one bidder on New York-Fort Worth (13 cents), Boston to Cleveland (24 cents), Cleveland to Nashville (14 cents), Washington to Chicago (25 cents). [Owing to cancellations in the early report of the bid openings, Aviation wrongly stated last month that Detroit Air Lines was low bidder on New routes.] Wisconsin Air Service was awarded the Billings-Cheyenne route (low bidder at 28 cents).

Contracts awarded in the course of the next two weeks to National Airways (Boston-Birmingham, 29.5 cents), Delta Aviation Corporation (Christiansburg-Wash., 27 cents), Varney Speed Lines (Pittsburgh-Pisa, 24 cents), Pennsylvania Air Lines & Transport Company (Detroit-Milwaukee, 39 cents).

To make sure that all mail users get the most efficient service possible, the Post Office Department is glad to certify the performance of new air carriers. The necessity of increased frequency of flights on new lines is being investigated. To get more people to send letters by mail, the department will conduct a publicity campaign to emphasize the advantages of air mail. A flat air mail postage rate of 6 cents an ounce will be in effect after July 1, when rates will be raised to 8 cents. The bill negotiated as a condition through Congress on June 6, when the Senate adopted the conference report already approved by the House (AVIATION, June page 160), and sent to President Roosevelt for signature. The bill is printed in full elsewhere in this issue.

New intermediate fields

Clearly as indicated with the Post Office Department's air mail development plan is the new airway installation program of the Aeronautics Board, designed to provide a greater

degree of flying safety. Intermediate landing fields, controlled by beacon lights, are straight lines will be constructed at 30-mile intervals on the inland airways system. The fields will be equipped with radio aids, beacons, and two-way radio stations. They will also be beacons lighted, identified by flashing beacon lights, and will be in the shape of triangles.

The intermediate route maps because will have effective directional beacon up to at least 35 miles in four directions. To overcome radio beacon and at present (located at intervals of 200 miles) has an effective range of four times that distance there is an intermediate emergency landing for the radio came to a stop, a difficulty which will be largely eliminated by the use of smaller beacons. Another advantage of the smaller beacons is that in mountainous country the airports can be roofed through passes and valleys, whereas with the big beacons the routes must be projected on a straight line regardless of the terrain. The new type of installation will be tested as three of the five airports now under construction by the Department

of Commerce with FWA fields (AVIATION, January, page 28 28): the Mississippi Valley route between St. Louis and New Orleans; the southern route between St. Paul-Minneapolis and Seattle; and the St. Louis-Tulsa airway. Upon the request of Director Vahle, the Defense Department, did allocate \$200,000 for additional air navigation facilities in these new airports.

Bigger and better

The fastest transport service ever operated between New York and Chicago was inaugurated on June 1 by TWA, Inc., with new 14-passenger Douglas transports, sleeping only at Pittsburgh. The outboard seats are only four hours, 25 minutes without food, five hours, five minutes. Three flights in each direction are made daily. The New York-Chicago schedule are mentioned in addition to the two transcontinental runs operating daily in each direction. On June 11 a new transcontinental record for flying time for commercial planes carrying passengers was made by a Douglas transport. The trip was in the air only 10 hours, 10 minutes. Stops made at Albuquerque, Kansas City and Columbus brought the total elapsed time up to thirteen hours, 30 minutes.

Northwest Airlines' San Diego is carrying capacity loads on two round trips daily over the Twin Cities-Chicago route. The company has taken up its option on two additional Douglas and placed an order for two more to fly day and night schedules from Chicago to Seattle. Non-stop, the transcontinental transport carries from St. Paul to Chicago in one hour, 30 minutes, from St. Paul to Seattle in about two hours.

Because of increased passenger, Eastern Air Lines resumed services between Newark and Washington from June 15 to eight round trips daily. Plans to use 12-passenger capacity are needed at all times.

A new Color schedule has been added by American Airlines between New York and Chicago, by way of Buffalo and Detroit.

United Air Lines reports that World's Race flights have as increased air traffic from New York and Chicago. Color adds to Chicago that the early summer traffic record is 30 per cent ahead of the corresponding period in 1955. Extra planes at the heavily congested airports between New York and Chicago are being operated on some schedules. The first of the ten new Boeing 367-D transports, equipped with turbo-propellers, is being delivered to United in late July.

Services between Newark and Atlanta City were started July 1 by Skyway Airways with tri-motor DC3s, and increased during the month to six round trips daily. A long-range special

leaves every Thursday for Atlantic City, Baltimore, and Washington. Nearly 2,500 miles of new airways were added to the Los Angeles-Memphis City route (AVIATION, June 15 page 38). Captain, operated by Walter Varney, who has a mail contract from the Mexican Government.

From Cleveland cases used that in the month of May, 11,687 passengers were logged through the Municipal Airport. Approximately 46,000 passengers were checked in or out during the first six months of this year, contrasting with 27,000 for the corresponding period last year.

North American reorganizes

Details of the reorganization of North American Aviation, Inc., to comply with conditions laid down by the government as regard to holding for use and operations, were announced on June 12. The pattern of General Motors

competitive as the dominating interest in the situation has not been altered. Representing General Motors on the new board of directors (indicated to the board of directors) are: John H. Thompson, Jr., as chairman; Henry D. De Poot, John Thomas Smith, Henry H. Hagan. Minority interests are represented by LeMott T. Smith, Edward F. Starnes, John Harris.

The first step in the reorganization consisted of the creation of three new operating divisions. The first was to replace Eastern Air Transport; TWA, Inc., succeeded to Transcontinental & Western Air, and General Air Lines to Western Air Lines. Eastern Air Lines is still 100 per cent owned by North American. Stock of General Air Lines, owned completely owned by the parent company is to be turned over to the Western Air Lines Corporation which owned all stock in Western Air Express, Inc., which in 51 per cent owned by North American Aviation. Stock of TWA, Inc., will be turned over to Transcontinental & Western Air's shareholders.

P.A.E. charges confusion

Such transport company to protest in court against the government's cancellation of air mail contracts at Pennsylvania Air Lines, Inc., during course on the route between Washington and Cleveland. Set was filed in the District of Columbia Supreme Court on May 21 against Postmaster General Farley to compel him to rescind his order of June 13. The latter had ordered cancellation of the routes between Washington and Cleveland. The charges are brought. Got of the bill of complaint: Postmaster General Farley acted without authority, and without giving it an opportunity to be heard. The company was deprived of its property without due process of law and without compensation, contrary to the Fifth Amendment to the Constitution. The act of the Postmaster General is refused to accept a bid from Pennsylvania Air Lines for temporary mail service was illegal because the penalty of declassification was reflected without it. There were no bids for the routes to be heard, which amounts to a Bill of Attainder to direct violation of the Constitution.

Philadelphia Air Lines is suing Mr. Farley as an individual not as Postmaster General, who United Air Lines' four subsidiary subsidiaries (AVIATION, June, page 165). These subsidiaries were merged on June 4 in a District of Columbia Supreme Court on the grounds that though they were distinct against Farley previously they were corporate entities under the United States Government which had not constituted to be sued. The companies will appeal.

Transcontinental & Western Air,

Calendar

July 1—Baltimore at Fort Worth. . . . Eastern Air Lines. . . . United States Air Force. . . .

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Inc., whose suit against Parley and Kelley (Aviation, May, page 185) was dismissed for the second time by the U.S. Circuit Court of Appeals in New York, will carry an appeal to the U.S. Supreme Court. Another test in the U.S. Court of Claims is under consideration.

New increases air power

Plans for construction of 225 planes are included in the budget estimate for the fiscal program initiated by Public Law 90-505. While no specific amount of money is mentioned in the bill, it is reported that \$5,500,000 will be allocated to the Navy to buy 54 fighters, 12 observation planes, 41 reconnaissance planes and 38 trainers. Another \$2,600,000 will provide equipment for the planes. \$2,700,000 for the expansion of the Naval aircraft factory at Fort Belvoir to meet the pressure of the Navy. Bill that 10 per cent of the 1,164 planes authorized be built in government facilities (Aviation, April, page 179). The bill also provides for the construction of twenty warships plus the General Board of the Navy, which is authorized to study the construction of "big deck" carriers, some of the type will be needed instead of the cost estimate arrangement for planes, the proposed carrier would have a three deck five times more to serve as a landing platform and accommodate about twenty planes. The construction of the Navy's fleet of aircraft carriers is additional plane armament would not compromise for the loss of gain and the high cost of maintaining such a small fleet (Aviation, April, page 179).

The USS Ranger class of the Navy's fleet aircraft carrier to be built as such, was commissioned in the Naval Operating Base, Norfolk, Va. on Jan. 4. Under the command of Capt. Arthur L. Brown, the 12,600-ton carrier with capacity for 22 planes will begin her shakedown cruise in August. The carrier will not authorize planes for the new carrier, construction authorized in 1958 were re-allocated to the Ranger. A second construction in the Navy Department will be engaged this summer in studying the question. Was the USS Ranger worth enough to a meeting with the most successful in the Caribbean to justify the cost of similar ships in the future?

The House Committee on Naval Affairs reported favorable the bill to appropriate \$5,500,000 for expansion of the Naval Air Station at Pensacola, Fla.

Air Corps military aircraft increased

The House Military Affairs subcommittee investigating aircraft purchases followed its first report discussing the proposed reduction of the Air Corps (Aviation, June, page 187) with a second report, presenting a general over-



COLLIER TROPHY FOR 1955

Frank Walter Collier, senior Presidential Commissioner after winning the Collier Trophy as chief architect of the Hamilton Standard Propeller Company. The trophy was awarded to the company in recognition of their development of the centrifugal disk engine.

haul of the Air Corps beginning with the removal of its chief, Major General Benjamin D. Folsom. The committee confirmed its violent attack against the policy of negotiated contracts, stating that Folsom and other officers under his command had been responsible for personnel violations of the 1956 Aircraft Procurement Law, which (according to some opinion) requires competitive bidding. General Folsom was also accused of changing aircraft specifications which he delayed delivery, so that the planes were obsolete when the Air Corps finally got them. Agnes the committee accused the General for failure to make necessary provisions for the Army and Navy, and second him of giving the impression that the Air Corps was not interested in the Army's aircraft as a matter of fact the various of fatal crashes had been given full press attention.

In addition the committee alleged that he had made false and misleading statements to the press in the course of his testimony. It is a common in the press, General Folsom described the report in "order and error" and pronounced himself ready and willing to meet his accusers at any time in open court. During the Great Lakes plane was kept, stated that he had acted as all others in the story held that he was doing the best thing for the Air Corps. They took action to initiate a few personnel in regard to purchasing supplies and negotiators. They pointed out that since the airplane constantly in being improved by various manufacturers and the design alone is changed and improved while no order is under con-

struction, it is obviously, impossible to purchase airplanes according to the formula of routine business negotiation and relationships.

It is understood that Secretary Derr will weigh the committee's report carefully and that no official action will be taken pending his decision and report to the President.

Disc-borders and trainers

Another angle in the well-known government armament presents itself with Secretary of the Navy Swenson's order to Great Lakes Aviation Corporation to go ahead with the experimental work on a new engine, the C-10. The \$628,125 contract for 27 disc-borders was awarded without competitive bidding. Competitor McGee, showing a military interest in matters of aircraft purchasing, took exception, interpreting the law as making competitive bidding for quantity purchases, and added that no credit would be allowed for any payments on negotiated contracts. Secretary Swenson replied that the law gave him authority to approve purchases for experimental purposes without competitive bidding. He explained that one Great Lakes plane was kept, stated to the Navy's satisfaction, and more of the same model were ordered to that further representation might be considered under that system. Commercial Representative McGee, later opinion of the Navy's procurement policy and useless account of the qualities of American aircraft. This claim made clear that Congress should make it the contractor's business to approve or

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disapprove Army and Navy airplane contracts.

To the Southern Aircraft Company the Navy awarded a \$200,000 contract for Class V20 training planes and parts.

Serious and civilian gained

The Baker Report approved by Secretary Derr is making a preliminary study of the technical operations of the Army Air Corps (Aviation, May, page 185), based testimony from ranking officials of the Air Corps, the National Guard, and the Navy. Previously, informative visits were made to Wright Field, Dayton, Ohio, and to the Air Corps Training Center at Randolph Field, San Antonio. Representatives of the aircraft industry, and of various interests entering into military aviation operations also appeared before the committee in its report.

Hamilton Standard also award

The Collier Trophy, annually awarded for the greatest achievement in aviation in America, the value of which has been demonstrated by actual and during the preceding year, was presented on May 20 to the Hamilton Standard Propeller Company for propeller work on the F-4 Phantom II. The 1958 committee also awarded, appointed by President Hyman H. Kimmel, the National Aviation Association, consisted of Ben Adams, Henry S. Land, chairman, Col. Edgar S. Gornell, Air Corps Reserve, and Chief of Staff at the Air Corps, the President and the Vice President of the War, Col. Charles M. Young, former assistant secretary of commerce for aviation, General Frank H. Hootch, who is Personnel General, and another for the first time of air mail in 1960, and Earl S. Freidly, editor of U.S. Air Force. Other winners in the western states for the first time have been awarded to Glenn H. Curtis, Grille Wright, Ernest A. Sperry, W. Starling Brown, Robert C. Leming, Charles L. Lawrence, S. Albert Root, Major E. J. Hoffman, Harold F. Pitzer, and Glen L. Martin. It has also been held by the U.S. Air Mail Service, the U.S. Army, the American Branch of the Department of Commerce, the National Advisory Committee for Aeronautics and the Federal Motor Car Company.

Northern air base proposed

Congressional aid for the further development of aviation in Alaska and for the strengthening of air national defense was sought in a bill presented to the House by Alaska Delegate Donald H. proposed the construction of an Army air base for at least 180 planes at Pitkin, Alaska. A military leading bill at Nome in Southeast Alaska, which reaches up to within 30 miles of Siberia, and another in Anchorage within striking distance

of the Aleutian Islands also are proposed.

Accident inquiries to be public

A bill to amend the Air Commerce Act of 1926, introduced to Congress by Senator Stephen A. McGowan and strongly supported by Secretary Derr, directs important changes in accident investigation procedure. It authorizes the Department of Commerce to hold public hearings and to make its findings public, when this is deemed to be desirable. When the accident occurs in serious or fatal injury, it is now mandatory that the Secretary of Commerce publish the findings. To prevent the department and its employees from becoming involved in civil suits arising

from such accidents, the bill provides that "no report of any investigation or hearing shall be submitted to evidence in any civil suit or in any civil action referred to in said investigation."

Another amendment will in the future authorize the Secretary of Commerce to grant broad inspection to aircraft owned by aliens, provided that they do not require a certificate of registration.

For the protection of night flight, persons owning aircraft at international law must provide adequate electronic lights at their own expense.

The authority granted to the department by the Act of 1926 to carry on research in air navigation facilities is extended to include power plants and accessories.

The Stephens bill was passed by both houses during the closing days of the session. It was signed by the President on June 20.

Designers get more time

The Department of Commerce extended the deadline for the completion of bids for 23 small transport planes (Aviation, June, page 180) at the request of members of the aircraft industry. The extension was granted to complete the necessary experimental work within the time first originally set. Specifications for the planes which satisfy advanced characteristics in design, construction and performance are printed on page 398 of this issue.

Falouts study U.S. aviation

Through the courtesy of the War Department, the officers of the Turkish Army are visiting aviation facilities in the United States, including the Wright Aircraft Plant, Dayton, Ohio. The Turkish Air Force is being trained by the American Air Force. The Turkish Air Force is being trained by the American Air Force. The Turkish Air Force is being trained by the American Air Force.

Come Hootch, born on June 8 when the plane he was pilot was crashed in the Catalina Mountains in New York in his aviation years of flying. Hootch had spent more than 100 hours, 1,000 of them at night. Born in Canada in 1915, he served in the Royal Air Force during World War II. He spent 1945-46 in the United States with American Airlines as first pilot. He was vice-president of the Air Line Pilot's Association.

Little Hootch began flying at 16, and joined the Massachusetts Institute of Technology aeronautical program where he was killed in an auto accident at Detroit, N. Y., on June 16. He was Massachusetts governor of the National Aeronautics Association, and an officer in the Hill Observatory Squadron of the National Guard.

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FLYING EQUIPMENT

Bellanca Senior Skyrocket

UNTIL within a few weeks, the American Bellanca "Colombus" (any the rest in power) was the only airplane to have ever made the North Atlantic crossing twice. Ocean-hopper seems to us as the fairly, however, for Bellanca airplanes have eight successful trans-Atlantic crossings to their credit and also the first (and only) coast-Pacific flight from Japan to the United States. One also holds the present world's endurance record set by Walter Lott and F. A. Dwyer in 1937. It is against such a background that the Bellanca models for 1959 are evaluated.

The Senior Skyrocket is typically Bellanca in all its features, but a number of important improvements have been made which make for better performance and general usability. Most obvious, from coast inspection, is the modification in the landing gear. Each wheel is supported by a single cantilever member extending from the lower part of the fuselage. There are no external struts, rods or wires of any kind. Wheel fuses turn axle ends and a reflection in landing gear drag of well over 60 per cent has been achieved as compared with the previous types of Bellanca undercarriage. All load-carrying mechanisms is contained in the fuselage. A pair of steel shock struts are mounted in extension, as opposed, hinged, transmitting landing gear loads from each wheel arm to the opposite side of the fuselage. All loads are taken in a welded steel frame or base



Latest Bellanca Skyrocket made in one piece with Pratt and Whitney S5H-Wing engine. Stick landing gear has no wire struts.



long across the fuselage structure proper.

The wing characteristics of the Senior Skyrocket are essentially those of new models, and the well-known airfoil wing loading has been retained. One feature has been added, however, and that is a split trailing edge flap to act as a down-draught or permit wing glides and slow landings in small fields. Although the wings are false stressed, at least, the entire flap is of riveted duralumin.

fuselage construction is conventional. In the new model the width has been increased by 4 in., giving an extra square foot of wing area, and a comfortable seat and a wide aisle. The cabin accommodates six passengers, including the two pilot seats forward. There are two chair seatings and a comfortable convenient all. All windows are of non-stressable glass. Cabin ventilation is provided through a duct under the floor, from which individually adjustable openings lead into the compartment. An exhaust type heater is provided for cold weather operation. The cabin finish and the equipment vary somewhat. The Standard Senior Skyrocket conforms with all requirements for passenger comfort and for serviceable interior trim. The De Luxe model may be had

with such extra equipment as special side windows, fold-in couch chair, generator, landing lights and fuses, radio landing and landing, artificial horizon and directional gyro.

The cockpit arrangement has been modified with all essential equipment within reach of the pilot. Dual controls are fitted, the wheel being of the throw-over type. Steering is from a dual wheel brake control fitted to the left-hand seat. Pilot seat is adjustable fore and aft for maximum comfort.

The Senior Skyrocket in Pratt & Whitney powered. The S5H-Wing rated at 325 hp at 7,000 ft. is standard equipment. A three-blade electric starter and head check are provided. The installation is surrounded by a full NACA cooling, attached by means of a compression system in which flow of air in individual ducts are made to it rapidly over the cooler box heads in place of a rammer screw tightening device. The rear cooling being the angle of all the largest ducts which can be lifted and removed easily in large sections to expose the rear of the engine and for accessories for inspection and servicing. With the 36 hp modification, the machine shows a high speed (at 7,000 ft.) of 185 mph. It cruises normally at 129 mph. The fuel flow can reach 1,240 lb. in the 60 minute tank at service ceiling of about 25,000 ft. Normal range is from 930 to 1,200 miles. The present specification for the Senior Skyrocket De Luxe model: Wing span, 35 ft. 6 in., length, overall, 27 ft. 11 in., overall height, 8 ft. 9 in., total wing area, 213 sq ft., weight empty, 3,308 lb., gross weight, 5,600 lb.

Bowling-du Pont Skyplane

VISITORS to this year's showing at Elkhart have already had ample opportunity to observe the behavior of two skyplanes turned out by

the Bowling-du Pont Company of San Francisco, Cal. One of their beautiful machines has been flown by Mr. Richard du Pont in a new world's distance record of 153 miles. One, fitted to special military plywood, was built for Mr. Warren E. Eaton, president of the Evening Science, and the other (in a special plywood finish) was made up for Mr. du Pont's son. New flying machines have been exhibited, such as an extraordinary combination of work, speed, dash and aerodynamic refinement, so that it seems quite safe to say that the new ships represent the advance in wing design practice in the United States if not in the world.

Careful structural design has yielded new rather remarkable results. The golf-like wings have a span of 62 ft. a total area of 203 sq ft. with an aspect ratio of 18.1. The empty weight is only 340 lb. In spite of their light weight the ships have been stressed in accordance with the new regulations of the Department of Commerce in which standard vertical gusts of 30 ft. per second at a forward speed of 30 mph, and a 15 ft. per second gust at 64 mph. Their landing air drag speed is 150 mph.

The wing is a true wingover with a built-in box-beam at approximately 30 per cent of the chord designed to carry

the loading. The entire rear section of the airfoil forward of the spar is a plywood shell designed to take the forward load. There is a light spar, but its primary function is to transmit the airfoil and the hinge loads to the ribs. It is supported at the fuselage and is without any end supports so that it does not take any bending loads. The ribs are spaced much closer together than strength requirements dictate primarily to achieve the exact airfoil contour. The airfoils are of light aspect ratio, and are differentially tapered with a ratio of approximately 3:1.

For the first time in this country leading edge flaps have been applied to skyplanes. On the Eaton and du Pont ships the flaps are of the split wing edge type, and extend for approximately 30 per cent of the total span. The control mechanism is in accordance with Department of Commerce specifications. We have had opportunity to talk with Mr. Eaton about the behavior of his ship with flaps down, and he mentioned that it is able to enter extremely small fields without mishap. The long control flap on the average skyplane is observed from this new possibility of other designs that sometimes accompany a landing in restricted areas. Not only is the glide naturally improved,

but the actual landing speed is reduced by about 80 per cent.

The fuselage is of true monocoque construction with no struts or spars. The plywood skin over laminated spars is built up. Three light longons are used in fuselage assembly. The landing gear consists of a single wheel set into the bottom of the fuselage. Such a small proportion of its bulk provides stability as shown that it is even so the total drag is almost negligible. The ship is so neatly balanced that it is possible for the pilot to keep it upright on the ground on its single wheel, a very light and also the use of the airfoil

The cockpit arrangements are notable. The pilot is completely enclosed except for small openings on each side just large enough to permit the necessary vision required vision. The seat has been designed to accommodate a baggage parachute and has been given special struts with an eye toward maximum comfort on long flights. The control arrangement consists of an elevator air-speed indicator and aileron control. The aileron control may also be actuated with a special low-speed control lever arranged so that it may be retracted into the body of the ship when not in use. The controls are of the "D" type, primarily to reduce the space required in the cockpit. Elevator and aileron control are automatically self-centered, in order to remove heavy control loads from the hands.

There is no horizontal stabilizer. The elevator is mounted on a fixed hinge-bar operated by a single direct quadrant. They are fully balanced and of sufficient size to provide ample control in low speeds, but good so as not to be excessively sensitive at high speeds or during airplane loss. The rudder is a partially balanced surface and is hinged so it has been removed built in as integral part of the fuselage.

The attachment of the fabric to the frame is simple in that the cloth is simply draped onto the ribs and pleated and is not stretched in the usual manner. In this way it is possible to minimize the true airfoil contours without the irregularities introduced by sewing. For ultimate accuracy, a great deal of attention has been paid to producing a high finish on wing and body surfaces.

As a result of careful design and construction, the new machines show remarkable performance. Calculations indicate that a gliding angle of 30:1 may be maintained at approximately 34 mph forward speed. The actual landing speed has been measured at 1.6 ft. per second. The theoretical landing speed with flaps down is 27 mph and with flaps down, approximately 21 mph. The performance of these ships at the hands of such experts as Warren Eaton and Richard du Pont will be watched with great interest.



Warren Eaton's "Eaton" in landing position with flaps down.



The seat from past construction to make the control yoke more comfortable, the pilot being seated under the pilot's seat.



The improved drag-reducing landing gear with shock-absorber equipment included in the fuselage has cut down resistance to undercarriage drag of over 60 per cent as compared to previous models.

A Monocoque with Flaps

IN the May issue of AVIATION we described the Model D Monocoque powered with a 145 hp Warner Super-Swallow engine. Amovements had just been made of another new Monocoque, the De Luxe Model 90, similar in general appearance and equipment to the Model D with the exception of power plant, and with the addition of leading edge flaps.

The latest model has a Luscombe B-266 engine of 90 hp with towing capacity Top speeds of 140 m.p.h. are reported with a normal cruising speed of 120 m.p.h. At cruising speed the fuel consumption is approximately 3 gal. per hour.

The flaps are operated from a push-pull control at the pilot's seat. Tests indicate that when the normal landing run with flaps down without the application of full or partial lift in the neighborhood of 400 ft., with flaps alone this is not to 152 ft. and with combined flaps and brakes it may be reduced to 100 ft.

Aerona Improvements

ALTHOUGH the Aerona plane produced by the Aeronautical Corporation of America of Cincinnati appears to substantially the same form as its parent plane, the 1934 model carries a number of engineering improvements which have resulted in better performance for these little ships.

The principal modifications on the Model C-3 (California) is in the landing gear where the former steel beam type has been replaced with a much stiffer, simpler design. The added weight and the supporting arms are attached to an elastic shock-absorbing mechanism which is completely enclosed in the outer parts of the landing. Air wheels are fitted on standard spindles. Reduced drag of the new design is achieved together with a new type of aileron wheel and control mechanism, has been made up in 13 in. p.h. with the 45-hp. (2500 c.p.m.) Aeronca B-111A engine.

The general specifications of the Aerona C-3 are: span 36 ft., length overall, 30 ft., height 7 ft. 10 in. empty weight (including oil) 1422 lb.



Monocoque 90, showing flaps in landing position.

weight empty, 470 lb.; gross weight, 700 lb.; wing loading, 52 lb. per sq. ft.; power loading, 22.5 lb. per horsepower.

Crouch-Bolas Dragonfly

ATTEMPTS to lift oneself by the tail straps, or to sail a boat by blowing into the sail from the stern alone, quickly reveals themselves against the solid argument of basic physics. The idea of producing lift in an airplane by utilizing aplanar effect in place of forward speed (however small it may remain) on first glance the self-propelled sail boat theory) falls into a category of different category, and contains sufficient promise to attract a solution of the aplanar speed range problem has been attracted the attention and the serious effort of a group of experienced British and American aeronautical engineers. Capt. R. J. Goodwin Crouch, a British officer of the former and present record of achievement in the sphere of military and civil aviation, including seven years as head of the Aeronautical Department of the Air Ministry, and Charles Bola, chief of design for George Parrell & Company (Leamington, England) from 1907 through 1928, have been investigating the problem of harnessing aplanar effect for the past several years. A high speed car resulted in the successful test flying of the ball-cylinder Dragonfly.

The theory of obtaining useful lift from the aplanar is not fundamentally new. It was suggested by Blunt in his book in 1842, but at that time the facilities of aerodynamics had not advanced sufficiently to permit him to make

full use of the idea. In a normal airplane the aplanar can be created only in the relatively little except forward movement. Due to the relatively small diameter of the average propeller, its backward is limited and is usually overruled by the interference pressure of the propeller or relatively light effect. Very little of it is possible directly over wing surfaces. It, however, it could be imagined that the wing of an airplane were located behind a large number of air jets which backed the whole lifting surface in a uniform direction. It is conceivable that an appreciable lifting effect might be developed. Obviously, this is impractical, but if a wing is shaped behind a number of large diameter propellers, so that the aplanar effect is relatively large proportion of the aplanar, it is not unreasonable to suggest that some very appreciable lift effect from them might be developed. This theory, then, is the basis of the Crouch-Bola idea, and has been embodied in the Dragonfly.

The Dragonfly is a nine type type of aplanar lift system. Contrary to its name, it does not have a conventional wing in the direction of the power plant and the use of comparatively large propellers which themselves are almost the entire wings. Two Monocoque four-cylinder inverted-in-line engines are mounted one in the other at each lower wing panel. The aplanar surfaces have comparatively little lateral area. Each engine is fitted with a wooden propeller 8 ft. in diameter. It was originally intended to install two specially designed Crouch-Bola Dragonfly engines at 90 hp each, utilizing 40-hp. propellers. Unfortunately, the Dragonfly engines were not available in time for the test, and the Monocoque were installed. Another compromise was made in the direction of rotation of the engines. It seems desirable to have the propellers rotate in opposite directions, but in the experimental type they were permitted to rotate in the same direction. It was thought that detrimental torque effect would be caused, but that has not been the case. A certain amount of adverse yawing tendency at takeoff speed was experienced, which again is expected to disappear when the right and left-hand power plants are installed.



The wing carry both slots and flaps the former being of an automatic type which is quite unsymmetrical. A series of pilot planes (also in S.A.C.A. arrangement) is mounted along the leading edge in each wing. They are divided up into a number of three sections in order that the portions which lie directly in the aplanar may take an different angle of attack from those outside the aplanar. The pilot planes are fixed in the wind at high speeds, their drag at this stage being nearly due to its direction. At low speeds, however, their upward movement is restrained by drag wires, under which conditions they act as effective slots. Their action is thus automatic and needs no manipulation by the pilot. The whole of the leading edge of the wing set of flaps, which can be operated in flight. The outer portions of each flap also operate as aplanar independent of their position in flaps. The flap control is from a lever on the pilot's left side. Outer controls are normal. The tail structure is in a single unit with vertical surfaces attached to the tips of the fixed aplanar so that the wind makes directly in the aplanar of the engine, and at the same time to improve the efficiency of the aplanar by the "blowing" effect of the fan. The adjustment of the aplanar from a lever in the pilot's seat is exceptionally good: the total range being 13 deg.

Although the full performance figures for the flap are not on available, the indications are that the top speed is in the neighborhood of 120 m.p.h. Although the full performance figures for the flap are not on available, the indications are that the top speed is in the neighborhood of 120 m.p.h. The indicated maximum speed is a high one, 38 m.p.h., but with a total load of 2670 lb. the machine has actually achieved a flying speed of 16.5 m.p.h., against a 30 m.p.h. and. These figures indicate a lift coefficient of 0.5, which is in close agreement with the wind tunnel test figure. With engine shut (that is, with the machine being in a normal tail aplanar in a plane) the recorded sailing speed on full load was 44 m.p.h., again in good agreement with the model test. Under the same conditions the sailing speed was measured at 17.5 ft. per second.

One complete picture of the experimental machine, the following shows:



The New Ryan S-T monocoque has considerably altered lines. MC Section has been ground so that this plane was made.

extension are given: Span 36 ft., wing all length, 30 ft., height, 9 ft., empty weight (including oil) 200 m.p.h., weight, empty, 1680 lb. gross weight, 2350 lb.; wing loading, 107 lb. per sq. ft.; power loading (at altitude) 54.3 lb. per hp.; power loading (at sea level) 102.2 lb. per hp.

The New Ryan S-T

IN MAY, 1937, a Ryan-built airplane broke history when the wheels at the feet of S. T. Ryan touched the ground at LeBourget. During the following years, many a U. S. airport heard one or more of Ryan's Dragonfly, a conventional modification of the former prototype.

On June 8, the first New Ryan S-T all-metal, low-wing, two-seater made its appearance, and flew through flights with its new design. With 85 hp. Monocoque B-266 engine, it showed a high speed in level flight of 142 m.p.h. It is estimated that the new aplanar power plant the Monocoque C-4 at 125 hp, with which it is expected to reach 152 m.p.h. With wing flaps down, the landing speed is reported to be slightly under 40 m.p.h., giving an amazingly good speed range.

The construction of aplanar used are somewhat unusual for a machine of this size. The landing is a metal mono-



coque built up entirely of 17 S. Alclad over 17 S. form. The aplanar engine mount is fastened to the fuselage through rubber cushions, and rubber pads are also provided between the engine and the fuselage. The wing struts (which are detachable from the fuselage) are of welded steel tubes, as is the landing gear. The wing panels are of composite construction with solid spruce spars, and 17 S. riveted metal of sheet. The entire winging edge to the rear of the front spar is covered with 17 S. sheet, but the remainder of the wing surface and the control surfaces are of metal covered. The aplanar are of a modified French type with lateral action. They are fixed forward and are mounted on a torque tube, which runs in-board to the central strut linkage. The flaps are made in construction of 17 S. sheet, with staggered ribs riveted to rubber spars. They are fabric covered.

Landing gear is of the sliding type with



Latest Aerona C-3 has closed up landing gear and new stabilizer.



Side view of the Crouch-Bola Dragonfly showing the high percentage of the total area covered by the aplanar flaps.

King travel also shock absorbers and Goodyear Air Wheels and knoes. The design is such that it is possible to remove the wheels without disturbing the furnace. The tail wheel is full swiveling and is fitted with an Air tire.

Deck controls are provided, with those in the front cockpit quickly removable. The horizontal stabilizer is fixed, but tabs on the trailing edge of the elevators provide longitudinal trim. These are easily controllable from either cockpit. The narrow oval fuselage, the inverted in-line engine and the narrow wing, permit a good field of view from each pilot's seat. A baggage compartment is fitted between the two cockpits.

Manuscript designed by Steven Feltus and Kenneth Hall for Nicholas-Winkel.

show: span 30 ft., length overall 21 ft. 54 in., height 6 ft. 21 in. wing area (including airbrake) 124 sq ft; weight empty 1,032 lb.; gross weight 1,550 lb. Cruising range (184 engine) 400 miles, (C4 engine) 390 miles.

U. S. Plane, British Power

In the April issue of *Aviation* we described the British-built Polaris engines which are being guaranteed in this country by the Nicholas-Beasley Aircraft Company, Inc., of Maryland, Md. One of the first American planes to be designed around the Polaris engine has just been completed at the Nicholas-Beasley plant by Mr. Ole Folvik, propeller manufacturer, and Mr. Sven Swanson, airplane designer. At the moment it is not planned to put the machine into regular production, but it is being offered at a constant load product available on special order.

The weight specifications given for this ship are realistic. The Type 22 Pelican engine (50 hp., geared 3:1) weighs only 125 lb. The conventional all-wood wing weighs 1 lb. per sq ft (including struts, covering, dope and bracing). As a result of these and other weight savings, the mass of model and its empty weight is relatively high, the figures being 300 lb. to 600 lb., respectively, giving a gross weight of 1,100 lb.

As indicated in the photograph, the ship is of the cabin type and accommodates two persons side-by-side. One is

Model A 1000 (Boschcraft) is filled with a Weighted Cylinder F 11 (single)

loops and snapping the harness across the chest. He is then ready to stand up and jump, using the up cord in the waist harness. The whole operation can be done in a very few seconds. The harness automatically adjusts itself to the wearer's size as the passenger rises from the seat. The weight of the equipment, complete with harness and pad, is 164 lb.

Custom-Built Berchraft

WILDER BEECINGS factory out in Wichita has just turned out a new custom-built Beechcraft capable of long sustained flight at high speed. The ship follows the general lines of former models, with negative stagger, streamlined nose retractable landing gear, and curved wings glass sandwiched. The model, however, has been fitted with a 699 hp Model F-11 Wright Cyclone engine cramping a 14-cylinder Standard Continental-type cylinder. With its

A NEW TYPE OF Saddle Bar for the India Chale Chale makes the cap convenient for both men and women.

AVIATION
July 1944

equipment it shows a top speed of 210 wph, cruises at 212 and has a normal range of 750 miles. With wing flaps down, the landing speed is in the rough ballpark of 60 wph.

In addition to the used instruments and equipment the Model A-17-7 is provided with an emergency exit, artificial horizon, directional gyro, mass fuel pressure gauge, and an electrical selector for fuel and oil. Dual control is standard equipment. The rear seats are fitted with shock absorbers designed to reduce passenger fatigue on long flights. The cabin is pressurized and is provided with an oxygen regulating system. A large baggage compartment is available. Other auxiliary equipment includes landing and navigation lights, radio beacon receiver, electrically operated parachute flares, dual electric

The general characteristics of the airplane are: span 34 ft 6 in.; length 24 ft 2 in.; height 8 ft 5½ in.; wing area 325 sq ft.; weight empty (varies with special equipment) 1,400 to 3,300 lb.; gross weight 5,200 lb.; wing loading 14½ lb. per sq ft.; power loading 7.5 lb. per hp.

440 Whirlwind Approved

THE new cylinder, R-605-E, Whetzel received its fourth rating from the Department of Commerce recently after its 50-hour endurance test. A new rating under A.T.C. No. 105 is for 440 hp at 2,250 rpm at sea level. This cylinder has been previously rated at 330 hp, 365 hp and 420 hp. The Whetzel and 540 differ from other near-cylinder models only with respect to compression ratio, supercharger ratio, and engine number of fuel required.

Although this engine is now being offered for commercial use for the first time, it has seen several thousand hours of service in military operations during the past two years. The son Comac P90C fighters which have been attached to naval airship operations are powered with this engine. Similar engines have been in operation in South America.

1,000-hp. Engine

ACCORDING to an article published in the June issue of our French contemporary *derrière* Engineering the French Hispano-Suiza Company has produced a new fourteen-cylinder radial air-cooled engine, which can turn has developed 1 120 hp at 2 100 rpm. Its annual range is 900 hp at 1 900 rpm. It is to be available both in direct drive and in geared form and will be supercharged to develop 950 hp at 2 100 rpm.

amounts up to approximately 11,000 lb.

The engine is of the usual two-row sided type with two staggered banks of seven cylinders each. The bore is 64 in. and the stroke 5.59 in., giving a total displacement of about 2,760 cu in. The dry weight is given as 1,322 lb (600 kg).

The main crankshaft is in two sections of three forged steel rather than the forged-steel crankshaft used here and abroad. The main-pins and the main cover plate carrying the auxiliary drives are of aluminum alloy. The two-throw crankshaft is forged in one piece. It is fitted with bronze counterweights and is carried on two roller bearings with a deep groove ball bearing to take the thrust. The main-pins construction resembles the end of ash

steering rack. Following a petrol and in recent Hispano engines, the master rod and an axle are fastened together with a series of mortise and tenon joints, locked by taper pins which run parallel to the bearing axis. All-magnesium pistons with internal oil-rings are employed. Each piston has three compressing rings and one oil-scraper. Cylinders are of composite construction with cast barrels and overboard aluminum alloy heads. Each has two valves. The valve-opening mechanism is duplicated, a cam plate in the nose-piece opening the front back valves, and a similar plate in the rear section taking care of the rear bank. The Mower engine has an electric supercharger coupled up through a friction clutch in the same manner.

AIRCRAFT AT WORK

This display plays an important part in New England's historic-hulap industry.

Air-Minded Lobsters

MAYBE the industry aren't as panicked, but the lobster industry is and has been taking a decided interest in the possibilities of aircraft in operations up and down the New England coast. Consolidated Lobster Company of Gloucester, Mass., flew its Keystone Constellation 180 hours in company business between Aug. 5 and Dec. 3 1933 when operations had to be suspended on account of ice in harbor waters. It went back into commission early in 1934.

The plant takes an active part in the company's production and distribution system, which extends from Livnorod and New Brunswick as far west as the Mississippi. Its principal function, however, is to collect and control the collection fleet, which operates in the waters north of Cape Agassiz. It is usually possible to reach any part of the fleet in less than two hours from the Gloucester office, a feature which has

level a good deal of countries' tone, and has allowed the company a distinct advantage over competitors in adapting purchase contracts to constantly shifting market conditions. Every listing here in Conchistola's fleet has a distinct marking on top of the vessel bows, neatly identified from the air. When a boat is overdue between stops, the plane is sent out to find it, render assistance if necessary, estimate the arrival time, and then save a great deal of expense by holding the plane in the air until the boat is sighted and can safely be brought ashore. The ship carries two-way radio, and is equipped with auxiliary equipment for open-air work.

Occasionally the plane is used for emergency distribution to customers in the East, or for general publicity purposes. For example, a large shipment of live lobsters was made in September, 1933, to a well-known Atlantic City restaurant. Five hundred pounds were delivered in good condition in less than three hours after leaving Gloucester.

THE BUYERS' LOG BOOK

AVIATION's Card Index of New Equipment

This department is designed to help readers locate manufacturers of shop tools, accessories or materials

MATERIALS

Cylinder lubricant

Purd Corporation,
Los Angeles, W.C.

PURBOL is an upper cylinder lubricant to be used as an auxiliary to regular engine lubrication. It is a liquidized graphite to be added in small quantities to the oil in the crankcase. Has a wide range of industrial application. An extensive test run was made by the Curtiss-Wright Flying Service at Glendale, Cal., on a 225-hp. J-3 engine—results available on request to manufacturer.

AVIATION, July, 1934

RADIO

Airport receiver

Wrayport Manufacturing Corporation,
Glendale, Cal.

AW all purpose radio receiving set has been announced. Designed especially for airport and general aviation use. Five tube two-band superheterodyne receiver with built-in dynamo, loud speaker. Current D of C. weather and surge losses, also intermediate band. Operates from 110-volt, 60-60 cycle, A.C. In modernistic cabinet 11½x16x11 in. Weight, 12 lb. complete.

AVIATION, July, 1934

RADIO

Dynamotor

Wrayport Manufacturing Corporation,
Glendale, Cal.

NEW dynamotor developed to eliminate B and C batteries in aircraft receivers. Operates from 6 to 12-volt battery, can deliver 50-100 volts at 50 ma. range, minus 12 volts at 50-100 volts at 40 milliamperes; and 125-250 volts at 50 milliamperes. Complete with filter, weighs less than 7 lb. Can, self-excited mounting base, tested in. May be mounted any place in airplane, and requires only one connecting cable.

AVIATION, July, 1934

SHOP EQUIPMENT

Air compressor

Washington Pump and Machinery Corporation,
Barnes, N. J.

THREE type VA-2 air compressor units are designed for shop and service station use. Compressor units are two-stage, vertical, belt driven from electric motor. Pump and motor mounted on top of horizontal tank. Automatic control. Starts range from 24 cu. ft. per min. to 32.0 cu. ft. per min. at 200 lb. per sq. in. pressure. Power required, 2 to 7½ hp. Tank sizes, 15-30 gal.

AVIATION, July, 1934

SHOP EQUIPMENT

Hand lubricator

Joseph Dixon Graphite Company,
Tarry City, N. Y.

THIS small device for injecting finely powdered graphite (Dixon's Graphite-Gum) consists of a rubber bulb to contain the lubricant, and a fine needle through which it is blown (by spraying the bulb). Sprays oil vapor and volatile material in form of acrolein. Can be carried in tool box without leaking. Folder (available on request) describes special uses in aeronautical field.

AVIATION, July, 1934

SHOP EQUIPMENT

Portable spray device

Earl Walker Company,
Daily News Building, Chicago, Ill.

PORT-A-SPRAY devices are designed to afford quick cleaning or painting services in locations where compressed air lines are not available. Units consist of lead lined metal fitted with various nozzles, handles, etc. which may be filled with the liquid to be sprayed, then "charged" with compressed air from some convenient source. Capacities, from 2 pt. to 8 qt. four models.

AVIATION, July, 1934

SHOP EQUIPMENT

Shaper

J. D. Wallace and Company,
134 South Chicago Ave., Chicago, Ill.

A SMALL, vertical spindle shaper for turning out short runs of special shapes, reworking, etc. for the small wood working shop mentioned. Drives driven by standard electric motor in base. Table raised and lowered by hand wheel 14 in. travel. Capacity between shaper column 2½ in., or 3½ in. using solid collars. Equipped with special fence for straight shaping.

AVIATION, July, 1934

SHOP EQUIPMENT

Soldering torches

Lude Air Products Company,
305 East 4th St., New York, N. Y.

A COMBINATION of best graded sizes of gas soldering torch to cover a wide range of shop requirements now on the market. The four sizes cover fine soldering (instrument, radio, etc.), light soldering (pipes, tanks, auto, etc.) medium soldering (welding, batteries, burning cable lugs, etc.) and heavy soldering (bending, straightening, etc.). This up is compact fabric carrying case.

AVIATION, July, 1934

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(Subsidiary of Bendix Aviation Corporation)

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TEXACO ASPHALT PRODUCTS (for runways, hangar floors and aprons and dust laying)

AIRWHEEL* NOW GOES INTERNATIONAL!

Ships in Italian, Swiss and Japanese service now equipped with Airwheel* Tires and Airwheel Hydraulic Disc Brakes

THE softer, safer landing of the Airwheel is winning this famous Goodyear product widespread recognition on modern airliners.

Tests show that they operate perfectly with retractable landing gears, and as a matter of fact, when tires and gears are lifted during flight, the old question of wind resistance is no longer a factor.



New ships of this type, built by General Aviation Manufacturing Corporation, are now in use by the Italian Air Company of Switzerland and Japan. Another ship is now in use by Western Air Express. All use Airwheel equipment, including both front wheels and tail wheel, and Airwheel Hydraulic Disc Brakes.



New Swiss-Marchetti—Italian ship, equipped with 25x15.4 Airwheel Tires and Hydraulic Brakes

It is worth while knowing, also, that the number of Goodyear Airwheels now in use on automobiles is five times that of all other super-soft tires combined—and with this spreading popularity on passenger cars, the name Airwheel becomes an increasing asset to passenger planes.

Why not have this asset on your ships? Write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.



When you buy a new ship, specify the Goodyear Airwheel and the new Goodyear Hydraulic Airwheel Brakes.

* IF IT'S A GOODYEAR AIRWHEEL, IT'S A GOODYEAR AIRWHEEL. Goodyear's trademark, registered in the U. S. A. and throughout the world, and is used to denote that Goodyear is the exclusive maker of AIRWHEEL Tires.



Lockheed Electra
...equipped with
Western Electric

2-way Radio Telephone

Built for highly efficient performance in transport, private corporation or individual owner service, the new Lockheed Electra incorporates the latest refinements in design.

Every Electra delivered to date has Western Electric Radio. In addition, a large number of those now on order will be similarly equipped.

Provision is made for installing receiver and transmitter about six feet from the pilot's compartment. Radio controls are conveniently located on a sub-instrument board. All wiring is in metal conduit.

Lockheed's choice of communication equipment was based on Western Electric's long record of faithful performance on the major airlines. For full details, write to Western Electric, Dept. 287A, 185 Broadway, New York, N. Y.

The method used in soundproofing the Lockheed Electra is also a result of Western Electric's unparalleled experience in the field of sound transmission.

Western Electric
Aviation Communication Systems

*Northern Electric in Canada



Western Electric Model 12 Type 2 way
Radio Telephone Receiver



Western Electric Model 14 Type 2 way
Radio Telephone Transmitter



Western Electric Model 15 Type 2 way
Radio Telephone Transmitter



Making Aviation History with **WRIGHT**



WRIGHT Series F Cyclones are equipped with Timken tapered roller roller arm bearings—for dependability, efficiency and reduced maintenance.

The adoption of Timken roller arm bearings has been justified over and over again by their performance in the outstanding endurance flights of aircraft powered by Wright Cyclones. Noteworthy examples are—The Lindbergh record 35,000-mile world tour, including crossings of the North and South Atlantic Oceans; the U. S. Navy flight from San Francisco to Honolulu—a distance of 2,425 statute miles—largest non-stop overseas west formation flight in the history of Aviation; and in Admiral Byrd's Curtiss-Wright Condor now stationed at Little America for the second flight over the South Pole.

Timken roller arm bearings are also giving a good account of themselves in outstanding types of commercial and military aircraft powered by Wright Cyclones—the new TWA Douglas airliner, which has spanned the United States in 13 hours and 5 minutes, American Airways' and Eastern Air Transport's fleet of Curtiss-Wright Condors; and in KLM (Royal Dutch Airlines) 16-plane Fokker transports, Curtiss Hawk Fighters, Curtiss A-12 Ground Attack Planes and the Martin Army Bomber—fastest two-engine plane ever built—are among the Cyclone-powered military types now in the service of the United States Military and Naval Air Forces.

It will pay you to see that roller arms in your aircraft engines are equipped with Timken Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
TIMKEN Tapered Roller **BEARINGS**



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